The possible existence of such special motives as those here suggested among the persons who are attempting to get a grant of land for the carrying out of their so-called national objects should form an additional inducement to men of science to redouble their efforts.

NOTES.

THE general programme for the Cardiff meeting of the British Association has now been arranged. The first meeting will be held on Wednesday, August 19, at 8 p.m., when Sir Frederick Abel, K.C.B., will resign the chair, and Dr. William Huggins, President-elect, will assume the presidency and deliver an address. On Thursday evening, August 20, at 8 p.m., there will be a *soirée;* on Friday evening, August 21, at 8.30 p.m., a discourse on "Some Difficulties in the Life of Aquatic Insects," by Prof. L. C. Miall; on Monday evening, August 24, at 8.30 p.m., a discourse by Prof. T. E. Thorpe, F.R.S.; and on Tuesday evening, August 25, at 8 p.m., a *soirée.* On Wednesday, August 26, the concluding general meeting will be held at 2.30 p.m.

THE arrangements for the International Congress of Hygiene and Demography are nearly complete, and the programme, corrected up to May 1, has been issued in the form of a pamphlet. It has been definitely fixed that the opening meeting, at which the Prince of Wales is to preside, shall be held on Monday, August 10, at 3.30. The sections (of which there are ten) will meet on the four following days from 10 to 2. The six medical and scientific sections will meet in the rooms of the Royal and other learned Societies at Burlington House. The University of London will give the use of its large theatre to the section for the hygiene of infancy and childhood, and two examination halls to the sections for architecture and engineering. The division of demography will meet in the Theatre of the School of Mines, Jermyn Street. Much attention is being given to the necessary social preparations; and there is already a long list of proposed entertainments and excursions.

A GENERAL meeting of the Federated Institution of Mining Engineers will be held in London on Thursday, the 28th inst., at 12 noon, and on Friday, the 29th, at 10 a.m., in the rooms of the Institution of Civil Engineers, 25 Great George Street, Westminster. Various works will be visited on the 29th inst.

THE Committee of the Cardiff Naturalists' Society have put on foot a petition in favour of Mr. Pease's "Bill to Amend the Wild Birds' Protection Act, 1880." They are appealing to other scientific societies to join with them in order to make the petition as effective as possible.

AT Mowbray, a suburb of Cape Town, Mr. Cecil Rhodes has bought for £16,000 land on which, it is understood, the proposed University is to be built.

THE death of Prof. Carl Wilhelm von Nägeli, the eminent botanist, is announced. He died at Munich, on the 10th inst., in the 74th year of his age, and will be buried at Zürich, in accordance with a wish expressed before his death. Prof. von Nägeli was a Foreign Member of the Royal Society. We hope on a future occasion to give some account of his scientific labours.

THE Australian papers announce the death of Dr. Richard Schomburgk, brother of the late Sir Robert Schomburgk, and for many years Director of the Botanic Gardens at Adelaide, South Australia. Dr. Schomburgk was associated with his brother in the Boundary Demarcation Commission of British Guiana in 1840, and, some years later, settled with another brother in South Australia as a farmer and wine-grower. On the death of Mr. Francis, in 1866, he was offered, and accepted, the post of Director of the Adelaide Botanic Gardens, which he held with much distinction until his death. He was an enthusiastic horticulturist, rather than a botanist—that is to say, as an author; and his services in connection with the establishment he directed were very highly appreciated, as the sketches of his career testify. Indeed, so long ago as 1883, a large number of his admirers subscribed the funds to procure his portrait for the Museum of Economic Botany, founded by himself. His literary work commenced, we believe, with his "Reisen in Britisch Guiana in den Jahren 1840–1844," the third volume of which is devoted to a "Versuch einer Flora und Fauna von Britisch Guiana," in which Schomburgk had the assistance of several other botanists. This work has not yet been superseded, though its usefulness is unfortunately much limited by the publication of a large number of new names without descriptions. In 1876, Dr. Schomburgk supplemented this work by his "Botanical Reminiscences of British Guiana." But his most valuable literary work relates to the botany, to the agricultural and horticultural capabilities of his adopted country, and especially to the Botanic Garden, of which he was to a great extent the creator. His name will long be remembered in connection with this establishment, which is, it is asserted, the "most complete paradise of flowers in the southern hemisphere."

ACCORDING to the Calcutta correspondent of the *Times*, the Miranzai Expedition, under Sir W. Lockhart, has obtained much valuable geographical information about places which, although within a few miles of the frontier, have been hitherto unvisited by Europeans. The surveys effected by the Kuram field force during the Afghan war have been carried on to the Kurmana Valley.

A RUSSIAN scientific expedition, under the command of Captain Bartshevsky, has left Samarcand for the exploration of Southern Bokhara, the Pamir district, and Kafiristan.

ON Saturday, May 30, at the Royal Institution, Prof. A. H. Church, Professor of Chemistry in the Royal Academy of Arts, will begin a course of three lectures on the scientific study of decorative colour.

THE Rev. H. N. Hutchinson has undertaken to write for Messrs. Swan Sonnenschein and Co.'s "Introductory Science Text-books" a manual of physical geology. A second edition of Dr. Hatch's "Petrology" in the same series, reviewed in our columns last week, has already appeared.

MESSRS. WHITTAKER & CO. have in preparation a "Library of Popular Science." Among the works to be included in it are "Astronomy," by G. F. Chambers; "Light," by Sir H. Trueman Wood; "Chemistry," by T. Bolas; "Mineralogy," by Dr. F. H. Hatch; "Electricity and Magnetism," by S. Bottone; "Geology," by A. J. Jukes-Brown; "Botany," by G. Massee.

MR. J. ALLEN BROWN has expounded in the *West Middlesex Standard* an excellent scheme—now printed separately—for a technical institute and museum for the Ealing Parliamentary division of Middlesex. This division comprises Ealing, Acton, and Chiswick, and Mr. Brown's proposal is that a technical institute and museum should be established in whatever position may be most convenient for these localities. An essential part of his plan is that the instruction shall be imparted by specially qualified teachers and lecturers, and that their duties shall be "migratory or peripatetic," so that classes may be conducted or lectures given in any part of the division, and on any of the subjects contemplated under the Technical Instruction Acts. We commend Mr. Brown's scheme to the careful attention of the Middlesex County Council, which will soon have to decide as to the distribution of the funds placed at its disposal for technical instruction. There can be no doubt that the proposed institutions would be of immense advantage to the three districts, for Mr. Brown has a very enlightened conception of the true nature of technical instruction. What he wishes is that the young workman shall acquire "a knowledge of the scientific or artistic principles which are applicable to his trade or industry," and that by the development of his powers of observation and insight into the laws which govern all things "he may afterwards be enabled to effect improvements and excel to a greater extent than heretofore in the work he desires to accomplish."

THE Göttingen Society of Sciences has recently offered the following prize in physics for September 30, 1893:—From the researches of W. Röntgen and A. Kundt on variation of the optical properties of quartz in the electric field, there appears to be a close connection between the electro-optic phenomena and the elastic deformations which that piëzo-electric substance shows under the action of electrostatic forces. An extension of these inquiries to a series of piëzo-electric crystals with various properties of symmetry seems highly desirable. The investigation should also be directed to determining whether the electro-optic phenomena in piëzo-electric crystals are caused exclusively by the deformations occurring in the electric field or, besides, by a direct action of the electrostatic forces on the light-motion. Prize, £25.

THE German Society for the Encouragement of Industry offers the following (among other) prizes: (1) How far is the chemical composition of steel, and especially the amount of carbon present, a measure of the usefulness of cutting tools? Prize, a silver medal and £300; date, November 15, 1891. (2) A silver medal and £150 for the best chemical and physical investigation of the most common iron paints. Date, November 15, 1894. (3) A gold medal and £150 for the best work on the magnetism of iron. This should comprise a critical comparison of previous observations; also personal observations on steel and wrought iron bars of the most various chemical composition possible, examination being made both of the strength of temporary magnetization with absolutely measured and varying magnetizing force, and the strength of permanent magnetism and its durability with regard to temperature-changes and vibrations. Date, November 15, 1893. (4) Investigation of the trustworthiness of the usual methods of determining the carbon in iron. Prize, a silver medal and £150; date, November 15, 1892).

THE extraordinary collection of mummies, papyri, and other objects of antiquarian interest recovered last February at Deir-el-Bahari is now safely housed in the Ghizeh Museum. According to the Cairo correspondent of the *Times*, all the objects are in good condition, although some anxiety was caused by the protracted journey by boats from Luxor. The correspondent says that the mummies mostly belong to the 21st Dynasty, and, though styled Priests of Ammon, are supposed to be the corpses of generals and other official dignitaries who bore ecclesiastical besides other titles. The 163 mummies and the 75 papyri are not yet unrolled, and it is difficult to form an estimate of their archæological value, as many of the sarcophagi bear different names on the outer and inner casings, whilst others have the names usually inscribed on the outer casings intentionally effaced. M. Grébaut thinks that, owing to this circumstance and the magnitude of the collection, some time will be required before any important communications can be made to the scientific world.

A SERIES of experiments has been lately made by Herr Rubner (*Archiv für Hygiene*), with regard to the familiar fact that not only dry high temperatures are more easily borne than moist, but dry cold causes much less discomfort than moist cold. Dogs, fasting or fed, being observed in an air-calorimeter, it appeared that, in all cases, moist air increased the loss of heat by conduction and radiation. For every variation of the air-moisture 1 per cent., heat was parted with to the extent of 0·32 per cent. In a previous investigation, Herr Rubner demonstrated the lessened yield of water by evaporation from animals where the air-moisture is increased, involving lessened loss of heat. Here, then, are two antagonistic influences. He is disposed to regard the increased radiation and conduction in moist air as the primary action, and the diminished evaporation as secondary. The colder feeling of moist cold than dry is readily explained by the increased heat radiation. In moist heat, with the sense of oppression it brings, this factor passes rather into the background. The degree of temperature, and some other influences, of complex nature, also affect the amount of radiation.

THE Meteorological Council have issued a publication containing the hourly means obtained from the self-recording instruments at their observatories for the year 1887. This work constitutes a new departure in the use made of the records of the self-registering instruments, and one which we think will be of much practical use to meteorologists. The publication of the hourly observations *in extenso*, at the request of a number of scientific men, began with the year 1874, and was continued until 1880, in a lithographed form, and the daily means were added in 1879; from the year 1881 to 1886 they were issued in a printed form. The Council, after careful consideration, have now come to the conclusion that it is preferable, for a time at least, to publish mean values only; hitherto no hourly means had been published by the Office, but in the present work these have been grouped into five-day and other periods, in a convenient form for discussion, and the necessity for dealing with an excessive number of values has thereby been obviated, while many useful tables not included in the old series have been added. It is proposed to calculate the means similarly for earlier years, while the original records will be carefully preserved, and will be available, should they be needed, for any special research.

THE Annual Report of the Director of the Royal Alfred Observatory, Mauritius, for the year 1889 shows that the island has again enjoyed immunity from storms; the greatest hourly velocity of the wind was 31 miles. The almost total absence of tropical cyclones in the South Indian Ocean during the year is considered by Dr. Meldrum as another confirmation of the law that these cyclones are fewest in number and least intense in the years of least solar activity. The mean temperature was 0°·7 below the average for the last fifteen years, and below the average in every month except July and October. The maximum shade temperature was 93°·1 on March 27, and the minimum 52°·4 on June 18. The rainfall was 8·56 inches above the average; the greatest fall in one day was 3·88 inches on March 11, although this amount was much exceeded in other parts of the island. On January 1, a waterspout burst on the Pouce Mountain; Port Louis was flooded, and some persons were drowned. The collection of observations made at sea is actively carried on; 324 log-books were received, and the observations duly tabulated. The Report also contains observations made at the Seychelles and Rodriguez.

IN a paper recently published in the *Meteorologische Zeitschrift*, Prof. Hellmann, of Berlin, shows, from observations taken at different British, Continental, and American stations, at which barographs are used, that there exists a close coincidence in the daily range of the monthly extremes and in that of the hourly values of the barometer. He finds that the hours of occurrence of the highest and the lowest readings of the barometer during a month agree almost completely with the times in which the normal daily range has its maxima and minima, both curves being so similar in shape that it may be possible to judge of the general character of the daily range of the barometer from knowing only the hours at which the monthly extremes mostly occur. Hence, as the lowest readings of the barometer are accompanied by cloudy and stormy weather, during which the effect of the solar radiation upon the surface of the earth and the heating of the lower strata of the atmosphere are quite insignificant, Prof. Hellmann concludes that Prof. Hann and others are right in assuming that the normal daily range of the barometer is chiefly an effect of the *absorption of the solar rays in the upper strata* of our atmosphere. Prof. Hann has applied the harmonic analysis to the numbers furnished by Prof. Hellmann, and, by combining several stations in a group, has found the coefficients of the periodic formula to be practically the same as those for the normal daily range. We should, however, like to see a further confirmation with respect to the coincidence of the lowest readings and the diurnal minima, since the lowest readings occur so frequently during the passage of a severe storm, which can scarcely be said to have any agreement with the ordinary diurnal fluctuation.

THE first paper in the last volume of Transactions of the Seismological Society of Japan is by Mr. Bertin, and describes the double oscillograph and its employment for the study of rolling and pitching. It traces curves automatically, showing the motion produced in a floating body by waves. The second paper is on the "Seiches" of lakes, by Dr. F. A. Forel, of Geneva, and discusses those variations in the level of the water of lakes with the investigation of which the author's name has been associated for some years past. Prof. John Milne describes the remarkable instrument invented by him for measuring and recording the oscillatory movements of railway trains. Mr. Mason contributes a paper, accompanied by carefully compiled tables, demonstrating the importance of elaborating some uniform system of timekeeping for the purposes of seismological observations. Prof. C. G. Knott, in his paper on earthquake frequency, explodes two of the time-honoured delusions of the popular mind in regard to earthquakes, viz. that they are more frequent during the night than the day, and that their periodicity is connected with lunar culminations. Mr. Otsuka gives an interesting account of the great earthquake that visited Kumamoto in July 1888; and Mr. Pereira contributes a carefully compiled record of all the earthquakes noted by him in Yokohama from March 1885 to December 1889. Mr. W. E. Forster writes on earthquakes of non-volcanic origin, caused, it is suggested, by the displacement of masses of land beneath the ocean. The volume concludes with various reports and papers by Prof. Milne, such as diagrams of earthquakes recorded in Tokio, a report on earthquake observations made in Japan during the year 1889, and an essay on the connection between earthquakes and electric and magnetic phenomena, which is full of matter of an interesting and suggestive kind.

ACCORDING to the *Colonies and India*, Mr. Alexander McPhee, a West Australian bushman, who has steadily been earning fame lately by his explorations in the central regions of Australia, started inland from Roebourne in July last on another tour of discovery, taking back at the same time an albino aboriginal whom he found and brought to Melbourne a couple of years since. News has been received from which it appears that Mr. McPhee, with the albino, Jun Gun, and a "black fellow" named Timothy, went along the coast some 250 miles to a station called Yinadong, when the party turned inland in an easterly direction. After travelling about 350 miles, Mr. McPhee came upon another albino, a boy of fourteen years, whom he describes as the most extraordinary specimen of humanity he ever saw. One old man in this camp told Mr. McPhee that when he was a boy he heard of a party of whites and horses dying a long way inland. The old fellow could give no particulars about this party, but Mr. McPhee feels certain, owing to his acquaintance with the habits and customs of the blacks, and being thoroughly conversant with their dialect, that a party of white men perished about forty years ago somewhere in the interior. He heard of Warburton's party, and saw a native who told him that he guided them to water. He also heard of two parties of whites who had lately been in the desert, but turned back. From his turning point to the coast of La Grange Bay, Mr. McPhee reckons he was about 250 miles in a south-east direction from that bay. He found the natives very friendly, and on no occasion was it necessary to keep a watch. The country is described as very poor. The only birds observed during the journey were an odd crow and a few sparrows about the water; not a track of a kangaroo or emu was seen.

SOME satisfactory statements as to the growth of collegiate education are made in the last official report on public instruction in the North-West Provinces and Oudh. Of individual colleges, Agra, at which the numbers in 1885 had fallen as low as 45, has increased within the last two years from 97 to 175, or by over 80 per cent., and the percentage of increase last year was in no case less than 20. The number of matriculated students, indeed, is rising so rapidly that the existing accommodation is said to be barely adequate; it will, the Government resolution says, become a question of urgent importance whether the increasing number of students should be provided for by additions to the staff and buildings at the colleges now in existence, or by the creation of new colleges, or by the strengthening of the college classes at high schools and adding to their number. "Government," it is added, "will necessarily be guided to a great extent by the nature and direction of the local demand, as indicated by the willingness of the residents of the principal towns to contribute to the increased burden of expenditure." On its present basis, at all events, the higher education of India has received a fair share of Government support. But if it is satisfactory, says the *Pioneer*, to find that collegiate education in its present form is making decided progress, and that it is becoming possible to throw the cost of the advance on private shoulders, it is a distinct disappointment that not a word is said, as not a step has been taken, in those new directions of educational activity where other provinces have not only started, but made appreciable progress. There may be two opinions as to the extent to which, or the means by which, it is possible to introduce technical education, but there can be no question that some movement is desirable. It may be hoped that the omission is due, not so much to a failure to estimate the importance of the subject, as to a desire to give it fuller treatment on a future occasion.

THE amount of apparent flattening of the vault of the heavens Prof. Reimann has lately attempted to measure by noting the point which seems to bisect an arc extending from the zenith to the horizon. From 83 observations at Hirschberg he found that this point was 21°·47 ± 0·08 above the horizon. This indicates a ratio of the vertical axis to the horizontal of 1 : 3·66. This apparent flattening has an annual period, and is dependent on cloud. The highest position of the bisecting point was assigned in autumn (21°·98), the lowest in spring (20°·42). The vault seems flatter the more the cloud. It seems least flat with a misty horizon; and the flattening seems less by night than by day. Curiously, several other persons whom Prof. Reimann got to make the same determination all gave higher values for the angle.

THE settlement of a purely philological question (that, namely, as to the position of the French accent), by a physical method, has been recently attempted by Dr. Pringsheim, of Berlin (*Naturw. Rdsch.*) The instrument used was König and Scott's phonautograph, into which a number of Frenchmen were required to speak; the measurement of the record being afterwards made by means of a tuning-fork curve running parallel with it. This instrument renders possible a determination of the duration, pitch, and intensity of each syllable, and Dr. Pringsheim discusses its indications. As a preliminary result, he finds that two-syllable words have the vowels pronounced with equal length and strength. Noteworthy differences appear in the curve of a word according as it occurs in the middle or at the end of a sentence. In the latter case, there is added to the characteristic word curve, a terminal curve with declining pitch and strength, which is nearly the same for different words, and corresponds to the sinking of the voice before a pause. The vowels and consonants show characteristic curves; and notably long wave-lengths occur with *n*, *l*, *b*, and *d*. The duration of syllables varies between 0·1 and 0·5 second; and between the syllables of a word there are often pauses of 0·03 to 0·2 second. The shortest syllable *é* in *été*, with rather slow pronunciation, consisted of 22 vibrations; yet the ear is capable of not only hearing the tone, but of detecting fine shades and differences in the mode of pronunciation. Further experiments in this direction, with an improved apparatus, are contemplated.

THE *Perak Government Gazette* states that a portion of an ethnographical collection formed by Signor G. B. Cerruti, in the island of Nias, has been recently acquired by the Government of Perak for the museum. Pulo Nias is one of a chain of islands bordering the south-western coast of Sumatra. The population is said to be numerous and of one race, though divided into many tribes under independent chiefs. Head-hunting is as common with them as it used to be in Borneo, and most of the houses have skulls hung up in them. Their weapons consist of iron-headed spears, mostly barbed, knives of two patterns, somewhat resembling the Kadubong Achi, with shields of two distinct types. No bows and arrows or blow-pipes seem to be known, nor are throwing sticks applied to their spears; boats also are not used by them, though rafts are sometimes made to cross the rivers on. The ironwork of their weapons is fashioned by themselves, and the upright double cylinder bellows is used to supply wind to their forges—the same in every respect as those used by the Semangs of Upper Perak, and the far away Malagasy. Helmets of black ijoh fibre are worn, somewhat similar to the cocoa-nut fibre ones of the Sandwich Islanders. Woven body armour is in use, in the shape of thick coats made of what appears to be the fibre of *Hibiscus tiliacens*. Buffalo hide armour is also said to be used, but is not represented in this collection. Attached to the sheaths of some of the knives are four or five animals' teeth, such as tigers, rhinoceros, &c., also a small carved wooden idol, and one or more bamboo boxes containing stones. In those examined there were twelve pebbles in each box. These stones are supposed to have been taken from the spot on which a man had been slain. All these charms are tied up into a bundle with red cloth, and bound with string on the upper front part of the sheath of the knife.

A COMPREHENSIVE study of the influence of forests on the daily variation of air-temperature has been recently made by Prof. Müttrich (*Met. Zeits.*), the data being from stations in Germany and Austria. *Inter alia*, this influence is greater in May to September or October than in the other months. In pine and fir woods it rises gradually from January to a maximum in August or September, then falls more quickly to a minimum in December; but in beech woods a minimum occurs in April, then there is quick rise, till the maximum is reached in July. The daily variation itself is greatest in May or June, both in forest and open country. The influence of the forest is to lower the maxima and raise the minima, and the former influence is in most months greater than the latter; in December and January, and occasionally in neighbouring months, it is less. The influence on the maxima in summer is greatest in beech woods, less in pine, and least in fir. The absolute value of the influence in woods of a given kind of tree is affected by the degree of density of the wood, being higher the denser the wood. The character of the climate (oceanic or continental) also affects the results. From daily observations in forest and open country, every two hours in the second half of June, it appears that, soon after 5 a.m. and 8 p.m., the air-temperature in the wood was equal to that in the open; that the maximum was about 0°·9 lower in the wood, and the minimum 0°·6 higher; that in May to September the difference sometimes reached 2°·7; that the maximum in the wood occurred about half an hour later, and the minimum a quarter of an hour earlier, than in the open; and that the daily mean air-temperature was about ⅓° less in the wood.

THE *Revue des Sciences Naturelles de l'Ouest* gives an account of the life of Mathurin Rouault, one of the pioneers in the geology of Brittany. Rouault was born in 1813, of a very poor family. At the age of ten, while engaged as a shepherd, he became interested in "stones" and "rocks," and began to make a collection. By the death of a relative he obtained possession of a small hairdresser's shop, where he worked on Saturdays and Sundays, spending the rest of his time in hunting for rocks. Although Geoffroy Saint-Hilaire visited his collection of specimens, and was much interested in them, nothing would have been done for the poor young geologist—who lived upon something like five centimes a day—if it had not been for General de Tournemine, who, stationed with the garrison in Rennes, had been attracted by him. It is said that one day he went into the shop, and, seeing an antique pistol which Rouault had bought for a few centimes to kill himself with, the general remarked, "That is just the pistol I am after: I want it for my collection." And without waiting for an answer he took the pistol, and gave the young man 100 francs. M. de Tournemine went still further. He revised a memoir which the illiterate geologist had written. This was read in the Academy of Sciences, and met with so much success that the author became well known. The town of Rennes gave him 800 francs a year to help him to live in Paris, and afterwards he was appointed Director of the Geological Museum of Rennes. But he was dismissed on account of quarrels with some unintelligent bureaucrat, and died in 1881. Before his time only five or six fossils were known in Brittany: afterwards they numbered 500 or 600. He spent two years or more in making up *Trinucleus Pongerardi* out of over 2000 fragments.

AN important paper upon the atomic weight and position in the periodic system of the rare element lanthanum is contributed by Dr. Brauner, of Prague, late of the Owens College, Manchester, to the current number of the *Berichte*. In his recent work upon the reduction of oxides by metallic magnesium Prof. Winkler advanced the view that lanthanum is a tetravalent element of atomic weight 180, instead of, as has hitherto been accepted, a trivalent element belonging to the boron vertical group of the periodic system, with an atomic weight of 138·5. If lanthanum were indeed tetravalent with atomic weight 180, it would probably be the missing element between ytterbium and tantalum on the one hand, and cerium and thorium on the other. Further, Prof. Winkler expresses the opinion that the old values of Rammelsberg, Zschiesche, and Erk, for the equivalent of lanthanum, are correct. These experimenters obtained the round number 45 for the equivalent, and this number multiplied by 4 gives Prof. Winkler's suggested atomic weight 180. If, however, multiplied by 3, the atomic weight 135 is arrived at, and Prof. Winkler argues that even if the element were trivalent its atomic weight would not be 138·5 but 135. Against these views Dr. Brauner brings forward the following experimental facts. In the first place, Hillebrand (working under Bunsen) found the specific heat of Bunsen's pure lanthanum to be 0·04475. No impeachment has ever been brought against this result, and Dr. Brauner sees no reason why it should not be accepted. Making use of Dulong and Petit's generalization and multiplying this number by 138, a normal atomic heat of 6·18 is arrived at, whereas if multiplied by 180 the abnormal value 8·07 is obtained. Again, an element of atomic weight 180 should possess a density of 8·2, whereas that of lanthanum is only 6·48, a specific gravity corresponding to an atomic weight of 138. Considering therefore the position of lanthanum in the trivalent boron vertical group assured, Dr. Brauner brings forward a redetermination of its atomic weight of his own in order to decide between 138·5 and 135. His experimental method consisted in converting known weights of the oxide into sulphate. The material employed was obtained by a lengthy process of fractionation with ammonium nitrate, the oxide eventually obtained containing the most positive of the cerite earths (lanthanum oxide) and showing no traces in the spectrum of any others. His value thus obtained is 138·2, a number closely agreeing with those of Cleve and Bettendorff. The earlier and lower values of Rammelsberg and others are shown to be probably due to the presence of yttria, which was not detected by these observers, inasmuch as the work of Thalén and Bunsen upon the spectrum of yttrium had not then been published. Hence lanthanum of atomic weight 138·2 retains the place in the trivalent group of the periodic system marked out for it by its well-known basic properties.

THE additions to the Zoological Society's Gardens during the past week include a Striped Hyæna (*Hyæna striata* ♀) from India, presented by Mr. B. T. Ffinch, C.M.Z.S.; two Hairy-rumped Agoutis (*Dasyprocta prymnolopha*) from British Guiana, presented by Mr. H. Barrington; two Brent Geese (*Bernicla brenta*), a Pintail (*Dafila acuta* ♂), two Wigeons (*Mareca penelope* ♂ ♀), a Common Sheldrake (*Tadorna vulpanser* ♀), two Golden Tench (*Tinca vulgaris*, var.), nine Golden Carp (*Carassius auratus*), British, presented by Mrs. Atkinson; eight European Tree Frogs (*Hyla arborea*) from the South of France, presented by Mr. Clifford D. Fothergill; a Crested Porcupine (*Hystrix cristata*) from India, a Tibetan Crossoptilon (*Crossoptilon tibetanum* ♀) from Western China, deposited; two Swinhoe's Pheasants (*Euplocamus swinhoii* ♂ ♀) from Formosa, two Japanese Pheasants (*Phasianus versicolor* ♀ ♀) from Japan, two Amherst's Pheasants (*Thaumalea amherstiæ* ♀ ♀) from Szechuen, China, a Black-necked Stilt Plover (*Himantopus nigricollis*), a Cayenne Lapwing (*Vanellus cayennensis*) from South America, purchased; a Wild Swine (*Sus scrofa* ♀) from Persia, received in exchange; two Indian Desert Foxes (*Canis leucopus*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

THE PHOTOGRAPHY OF FAINT NEBULÆ.—In the Journal of the British Astronomical Association for February, Dr. Max Wolf, of Heidelberg Observatory, contributes a note on a nebula surrounding ζ Orionis, the third star in the belt, which he has discovered on photographs taken with a 4-inch portrait lens. Some reproductions submitted to the Association show a large amount of nebulosity south-west of ζ, also nebulous ground around ζ, and a nebulous star north of ζ. Dr. Wolf's note is important, inasmuch as it indicates that the 4-inch portrait lens used at Heidelberg gives results which compare favourably with those obtained at Harvard with a much larger instrument, viz. the Bache equatorial of 8 inches aperture and 44 inches focal length. With regard to the use of portrait lenses for celestial photography, Dr. Wolf makes a few succinct remarks. In photographing the stars, the intensity of the image depends only upon the area of the lens employed, and an instrument of 20 inches diameter therefore requires 25 times less exposure than one 4 inches in diameter having the same focal length, in order to obtain the same number of stellar images. But it is a different thing with comets, nebulæ, and the like—bodies having a finite area. The intensity of the image at the focus then varies as the fraction $\left(\frac{d}{f}\right)^2$, where *d* is the diameter of the object-glass, and *f* its focal length. If, therefore, the intensity of the light received with an aperture of 20 inches and focal length of 100 inches be expressed by 0·04, that of a portrait lens of 4 inches aperture and 12 inches focus is 0·11. This shows that in order to photograph the same faint nebula, the instrument of 20 inches aperture requires an exposure about three times as long as the 4-inch portrait lens.

Another paper having the same purport is contributed by Dr. Holden to vol. iii. No. 14, of the Publications of the Astronomical Society of the Pacific, from which it appears that from 80 to 100 minutes' exposure with the 33-inch Lick telescope will give about the same number of stars as 205 minutes' exposure with Mr. Roberts's 20-inch reflector. When, however, the amount of nebulosity depicted is considered, the advantage is considerably in favour of the short-focus reflector, a comparison of the results obtained with the two instruments indicating that 15 minutes' exposure with the reflector is about as effective in showing the nebulosity of Orion as 60 minutes' with the refractor.

VARIATIONS IN LATITUDE.—Prof. H. G. van de Sande Bakhuyzen extends our knowledge of this subject in a paper contained in the March number of the *Monthly Notices* of the Royal Astronomical Society. The conclusions deduced from the investigation of observations of Polaris made between 1851 and 1882, and the interesting researches of Mr. Thackeray (Memoirs R.A.S., vol. xlix. p. 239), may be summed up as follows:—(1) The monthly discordances in the zenith distances of Polaris are, for the greater part, not caused by a real variation of latitude, but chiefly by an effect of temperature. (2) It is not possible to explain those discordances by an error in the indications of the exterior thermometer, or by an influence depending only on the exterior temperature. (3) The discordances can be explained, for the greater part, by a cause depending on the difference of the exterior and interior temperatures. (4) Probably that cause is a refraction in the observing-room, and its effects are sensibly proportional to those differences of temperature. (5) The discordances corrected for that refraction are about the same for both culminations, and can be explained by a real variation of latitude.

An investigation of the mean North Polar distances of Polaris in both culminations observed at Greenwich between 1883 and 1889 leads to the conclusions: (1) that it is probable that the observations of Polaris at Greenwich confirm the variations of latitude observed elsewhere in 1884–1885 and 1889–1890; (2) that there is a very strong probability that the variations in these years had an exceptional character, and do not agree with the annual variations, deduced from the observations of Polaris at Greenwich during the period 1851–1882.

RE-DISCOVERY OF WOLF'S COMET (1884 III.).—*Astronomische Nachrichten*, No. 3033, contains the information that Wolf's periodical comet was observed on its return by Prof. Barnard, of Lick Observatory, on May 3·9792 G.M.T. The following ephemeris is from one given in *Edinburgh Circular* No. 15, by Prof. Berberich. The brightness of the comet at re-discovery has been taken as unity.

Ephemeris for Berlin Midnight.

1891.	Right Ascension.			Declination.		Brightness.
	h.	m.	s.	°	′	
May 23	23	16	31	+ 17	47·1	1·44
,, 27		25	42	18	42·8	1·54
,, 31		35	0	19	37·7	1·65
June 4		44	26	20	31·4	1·77
,, 8		53	59	21	23·9	1·90
,, 12	0	3	40	22	14·9	2·03
,, 16		13	30	23	4·0	2·18
,, 20		23	26	23	50·8	2·33
,, 24		33	32	24	35·2	2·50
,, 28		43	45	25	16·9	2·68
July 2		54	5	25	55·4	2·88
,, 6	1	4	34	26	30·3	3·08

The comet will pass perihelion on September 3·3199 Berlin mean time. It is near α Pegasi at the present time, and may therefore be seen just before sunrise. The motion is towards Andromeda.